

ST 2623.01 US
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REMARKS

I. Status

In the Office Action mailed December 8, 2003, the Examiner noted that claims 1-5 and 22-35 were pending; withdrew from consideration claims 6-21; rejected claims 1-5, 22, 25-28, and 32-35; and objected to claims 23, 24, and 29-31. Thus, in view of the foregoing, claims 1-5 and 22-35 remain pending for reconsideration, which is requested. No new matter has been added. The applicant respectfully traverses the rejection.

II. Response to Arguments

The Examiner alleges that Katagiri et al. discloses "an optical head apparatus comprising at least one solid state laser and an integral slide, the solid state laser and integral slider fabricated from a single, monolithic semiconductor substrate".

However, the relevant section of Katagiri et al. (Fig. 9, SPIE Vol 2514/103) states:

The LD is mounted on this slider so as to face the recording medium, thus, a small constant external cavity length is automatically obtained. Here, a monitor photo-diode (PD) is monolithically integrated on the same wafer of the LD, to achieve a small-mass head".

The above section does not disclose a "solid state laser and a slider, said solid state laser integral with said slider". In fact, the reference explicitly states that the LD is "mounted" on the slider and not part of the same semiconductor substrate. The Applicant requests that Examiner find a reference showing a "solid state laser and a slider, said solid state laser integral with said slider" and part of the same substrate or withdraw the rejection.

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Ukita et al. discloses on page 5561 an "integrated flying optical head. The optical head consists of a monolithically integrated laser diode and a photodiode attached (emphasis added by applicant) to the slider". FIG. 6 of Ukita et al. appears to disclose a photo-diode integrated with a laser -diode, however, does not show " a solid state laser and a slider, said solid state laser integral with said slider" as recited in the independent claims. The Applicant requests that Examiner find a reference showing a "solid state laser and a slider, said solid state laser integral with said slider" and part of the same substrate or withdraw the rejection.

III. Rejection of claims under 35 U.S.C. § 102(b)

Claims 1-3 and 5 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Katagiri et al. ("Optical heads based on coupled-cavity laser diodes", SPIE Vol. 2514/100). The applicant respectfully traverses this rejection.

Claims 1, 2, and 5 of the present invention recites a "solid state laser" and an "integral slider fabricated from a single, monolithic semiconductor substrate". The Office Action cites to page 103 of Katagiri et al. which describes a flying head system. Katagiri et al. states that "[T]he LD is mounted on this slider" (section 3-1, lines 9-10). Furthermore, the blow-up diagram on Fig. 9 clearly shows the LD-PD chip of Fig. 10 mounted on the "slider". Thus the slider is actually attached to the LD-PD chip. That is, the LD and slider are two separate components attached to each other. This configuration has already been pointed out in the Background to the Specification which states "An exemplary prior art attachment process involves careful positioning of the slider on an optical flat, applying a suitable quantity of adhesive or solder to the appropriate locations on the slider, and then urging the laser or lasers along the optical flat.." (page 2, lines 14-17). The Background goes on to explain that such a mechanical attachment procedure is difficult and time-intensive. The present invention solves this problem by integrating the slider and laser into a "single, monolithic semiconductor substrate". Katagiri et al. shows the

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conventional structure of attaching the laser to slider, and thus does not show the laser and slider made of the same semiconductor component as recited in the present invention.

As for claim 2, as noted above, FIGs. 9 and 10 shows an integrated LD and PD on a semiconductor chip, but does not show a solid state laser and slider on a single semiconductor substrate.

As for claims 3 and 5, Katagiri et al. does not show an "air bearing surface". The blow-up of Fig. 9 identifies an "air flow" between the slider and the recording medium but does not show any "air bearing surface" etched into the slider. Thus, Katagiri does not disclose the "slider including an air bearing surface" as recited in claims 3 and 5.

Therefore, the present invention recited in claims 1-5 is not suggested by the cited prior art.

IV. Rejection of claims under 35 U.S.C. § 102(b)

Claims 22, 25 and 32 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Ukita et al. ("Applications of an extremely short strong-feedback configuration on an external-cavity laser diode system fabricated with GaAs-based integration technology", Applied Optics, Vol 33, No. 24, August 20, 1994). The applicant respectfully traverses this rejection.

Claim 22 recites to a "semiconductor substrate" including at least one "laser region" and a "slider region". In contrast to the present invention, Ukita et al. discloses on page 5561 an "Integrated flying optical head. The optical head consists of a monolithically integrated laser diode and a photodiode attached (emphasis added by applicant) to the slider". That is, the LD and slider are two separate components attached to each other. This configuration has already been pointed out in the Background to the Specification which states "An exemplary prior art attachment process involves careful positioning of the slider on an optical flat, applying a suitable quantity of adhesive or solder to the appropriate locations on the slider, and then urging the laser or lasers along the optical flat." (page 2, lines 14-17). The Background goes on to

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explain that such a mechanical attachment procedure is difficult and time-intensive. The present invention solves this problem by integrating the slider and laser into a "single, monolithic semiconductor substrate". Ukita et al. shows the conventional structure of attaching the laser to slider, and thus does not show the laser and slider made of the same semiconductor component as recited in the present invention.

As for claim 25, Ukita et al. does not disclose a semiconductor substrate having an air-bearing surface. For an example of a semiconductor substrate having an air-bearing surface, see air-bearing surface 42 and air flow cavity 40 on the substrate of Fig. 2 of the specification.

As for claim 32, page 5557 of Ukita et al. does not disclose a laser including an emission facet having an aperture therein.

Therefore, the present invention recited in claims 22, 25 and 32 and depending claims therefrom is not suggested by the cited prior art.

V. Rejection of claims under 35 U.S.C. § 102(b)

Claim 26 stands rejected under 35 U.S.C. § 102(b) as being anticipated by Ukita et al. ("Read/write performance and reliability of a flying optical head using a monolithically integrated LD-PD", Applied Optics, Vol. 30, No. 26, Sept. 1991).

Because claim 26 is a dependent claim of claims 22 and 25, claim 26 is patentable for the same reasons stated above for claims 22 and 25.

The Examiner cites to Figs. 1 to 15 of Ukita et. al. as allegedly showing an "air bearing surface comprising a protective layer of material". However, Fig. 1 merely shows a slider with an LD-PD attached and Fig. 15 shows a photograph of a slider surface. Ukita et al. does not disclose a semiconductor substrate having an air-bearing surface. For an example of a semiconductor substrate having an air-bearing surface, see for example, see air-bearing surface 42 and air flow cavity 40 on the substrate of Fig. 2 of the specification.

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VI. Rejection of claims under 35 U.S.C. § 103(a)

Claim 4 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Katagiri et al. ("Optical heads based on coupled-cavity laser diodes", SPIE Vol. 2514/100) and further in view of Thorton (U.S. Patent 5,978,408).

Claim 4 is dependent on claim 2, and thus Katagiri et al. does not disclose the elements of claim 4 (a "solid state laser" and an "integral slider fabricated from a single, monolithic semiconductor substrate") for the same reasons stated above for claim 2. The Examiner further cites Thorton for disclosing a VCSEL structure. However neither Katagiri et al. nor Thorton suggest any motivation to combine a semiconductor substrate having a laser and slider fabricated into a single substrate with a VCSEL laser. Without, having such a motivation, it would take undue experimentation to determine whether such fabrication is possible. Since, the motivation does not appear in the prior art, it would not have been obvious to one of ordinary skill to have made the combination.

Therefore, the present invention recited in claim 4 and depending claims therefrom is not rendered obvious by the cited prior art.

VII. Rejection of claims under 35 U.S.C. § 103(a)

Claims 33-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ukita et al. ("Applications of an extremely short strong-feedback configuration on an external-cavity laser diode system fabricated with GaAs-based integration technology", Applied Optics, Vol 33, No. 24, August 20, 1994) in view of Hopkins et al.

Claim 33-35 depend from claim 32 which depends from claim 22. Thus Ukita et al. does not disclose the elements of claims 33-35 for the same reason as was discussed above in the traverse of the rejection to claim 22. The Office Action further cites to Hopkins for allegedly disclosing a semiconductor laser having an output wavelength λ , and said aperture has a width w such that $w < \lambda/2$. However neither Ukita et al. nor Hopkins et al.

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suggest any motivation to combine a semiconductor substrate having a laser and slider fabricated into a single substrate with a laser having these characteristics. Without, having such a motivation, it would take undue experimentation to determine whether such fabrication is possible. Since, the motivation does not appear in the prior art, it would not have been obvious to one of ordinary skill to have made the combination.

Therefore, the present invention recited in claims 33-35 and depending claims therefrom is not rendered obvious by the cited prior art.

VIII. Rejection of claims under 35 U.S.C. § 103(a)

Claim 27 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ukita et al. ("Applications of an extremely short strong-feedback configuration on an external-cavity laser diode system fabricated with GaAs-based integration technology", Applied Optics, Vol 33, No. 24, August 20, 1994) in view of Polycarpou et al (U.S. Patent 6,466,410).

Claim 27 which is dependent on independent claim 22 is patentable for the same reason as claim 22. Furthermore, claim 27 recites to an air bearing surface (claim 26) comprising a protective layer comprising a material, one of which can be diamond-like carbon. In contrast, column 5, lines 50-60 of Polycarpou et al. discloses a "pattern of protective pads (not shown) formed of a deposited DLC material on the air bearing surface". Thus, in Polycarpou the DLC material is being deposited on protective pads and not the air bearing surface as recited in claim 27. Thus, Claim 27 is not rendered obvious by the prior art.

IX. Rejection of claims under 35 U.S.C. § 103(a)

Claim 28 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ukita et al. ("Applications of an extremely short strong-feedback configuration on an external-cavity laser diode system fabricated with GaAs-based integration technology", Applied Optics, Vol 33, No. 24, August 20,

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1994) in view of Wilde et al. (U.S. Patent 6,414,911).

Claim 28 which is dependent on independent claim 22 is patentable for the same reason as claim 22. Furthermore, claim 28 recites a first side electrical contact and a second side electrical contact electrically accessible from the first side of a semiconductor substrate. In contrast, column 8, lines 50-60 of Wilde et al. discloses an electrical contact point located on a mirror (and not a semiconductor substrate as recited in claim 28). Furthermore, Wilde et al. does not disclose both electrical contacts electrically accessible from the first side of the semiconductor substrate. Thus, claim 28 is not rendered obvious by the prior art.

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X. Concluding Matters

In view of the foregoing remarks and amendments, it is respectfully submitted that each of the claims distinguishes over the prior art, and therefore, defines allowable subject matter. A prompt and favorable reconsideration of the rejection along with an indication of allowance of all the pending claims is respectfully requested.

Should there be any remaining questions to correct format matters, it is urged that the Examiner contact the undersigned attorney with a telephone interview to expedite and complete prosecution.

If any further fees are required in connection with the filing of this response, please charge same to our Deposit Account No. 04-1175.

Respectfully submitted,

DISCOVISION ASSOCIATES

Date: March 4, 2004

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